भारतीय मानक
Indian Standard

IS 9234 (Part 1) : 2021

ठोस अपशिष्ट के नमूने की तैयारी और परीक्षण के लिए विधि

भाग 1 विश्लेषण के लिए नमूने की तैयारी

(पहला पुनरीक्षण)

Methods of Sampling and Test for Solid Waste

Part 1 Preparation of Samples for Analysis

(First Revision)

ICS 13.030.10

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Solid Waste Management Sectional Committee, CHD 33

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards after the draft finalized by the Solid Waste Management Sectional Committee, had been approved by the Chemical Division Council.

This standard was originally published in 1979. In the preparation of standard, considerable assistance was taken from the publication ‘Physical, chemical and microbiological methods of solid waste testing’ issued by the US Environmental Protection Agency, USA, 1973.

This revision has been taken up to develop the Solid Waste test method standards as parts of IS 9234 *Methods of sampling and test for solid waste* to find the relevant test methods instantly. This standard being published as Part 1. The other standard being published along with this standard as Part 2 is the revision of IS 9235 : 1979. After publication of IS 9234 (Part 2), IS 9235 : 1979 shall be withdrawn.

During this revision, attempt has been made to incorporate changes according to the latest developments in the field. Efforts also have been made to align the terms, such as ‘solid waste’ with the definitions given in solid waste rules notified by Government of India as amended from time to time.

The composition of technical committee responsible for formulation of this standard is given in Annex A.

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’.

Indian Standard

METHODS OF SAMPLING AND TEST FOR SOLID WASTE

PART 1 PREPARATION OF SAMPLE FOR ANALYSIS

(First Revision)

1 SCOPE

This Indian Standard (Part 1) prescribes a method for preparation of samples of solid waste for physical, chemical and microbiological analysis.

2 REFERENCES

The standard listed below contains provisions, which through reference in this text, constitute provisions of this Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below:

IS No.	*Title*
9569 : 1980	Glossary of terms relating to solid wastes

3 TERMINOLOGY

3.1 For the purpose of this standard the definitions of the terms, symbols and units given in IS 9569 and the following shall apply.

3.2 Solid Waste — Solid waste includes solid or semi-solid domestic waste including sanitary waste, commercial waste, institutional waste, catering and market waste and other non residential wastes, street sweepings, silt removed or collected from the surface drains, horticulture waste, agriculture and dairy waste, treated bio-medical waste excluding industrial waste, bio-medical waste and e-waste, battery waste, radio-active waste generated in the area under the local authorities and other entities.

4 PREPARATION OF SAMPLE FOR ANALYSIS

Crude samples are not ready for examination. The three basic operations required to prepare the sample for detailed analysis are drying, grinding or pulverizing, and mixing. They should be ground and homogenized further after drying. After grinding, it is subjected to mixing in a rotating mixer. The end products of these operations should be so thoroughly homogenized that portions weighing 100 to 200 kg may be extracted for analysis from the lot of 1 to 2 Tons specifically for finding the calorific value. The standard protocol of coning and quartering shall be followed before proceeding for further processing of the sampling. The procedure for all types of organic materials is essentially similar, if compost samples have already been coarsely ground either in a hammer mill or rasping device.

NOTE — If any moisture is found condensed on the walls of the container, it should be reabsorbed in the sample. When handling refuse, the analyst should use gloves, if possible of neoprene-coated canvas. He should also wear a face mask, such as a surgical mask, when preparing samples, especially when they are in finely divided form.

5 GENERAL REQUIREMENTS OF SAMPLING

It is of utmost importance for all analyses that the samples be representative. Cursory samplings reveal very little about the true composition of the material and may lead to erroneous conclusions.

5.1 Refuse

5.1.1 A mobile hammer mill shall be used to take a crude sample of Solid Waste for grinding and homogenization.

5.1.2 Quantity of 100 to 200 kg may be taken as the basic unit for a sample which may be taken at variable intervals depending on the amount of waste. In accordance with the purpose of the analysis, 2 to 4 individual samples may be ground together in order to reduce the number of samples during more lengthy tests.

5.1.3 The ground refuse has to be mixed intensively. During mixing, about 10 to 20 small individual portions are taken and filled into air tight plastic bags in quantities of 1 to 2 kg, to be stored as samples. This heterogeneous mixture is the crude sample of solid waste.

5.2 Compost

Grab samples (1 to 2 kg) shall be taken from as many parts of the windrow as possible and well mixed. It shall be ensured that equal amounts are taken from all parts. The actual sample of 1 to 2 kg shall be taken from this mixture. In the same way compost samples shall be taken from the test material in plastic baskets and small windows. The mixture obtained in this way is the crude sample of compost.

5.3 Sewage Sludge

Before a sample is taken, the sewage sludge shall be well homogenized. However, too intensive mixing with a high speed agitator should be avoided if the sample is to be used in dehydration tests (flocculation and filtration tests). The sewage sludge obtained in this way is the crude sample of sewage sludge.

5.4 Residue after Incineration of Bio-medical Waste

5.4.1 The crude sample shall be taken directly from the conveying system under examination if possible. Fly ash and riddlings shall be taken from the corresponding areas.

5.4.2 The size of the sample shall depend on the kind of information sought and the structure of the material. In the case of single samplings (which may have a random composition), a large quantity should be taken and prepared. For longer examination periods, in which several single samples are taken at smaller intervals, the quantity may be fixed at 100 kg per sampling. Considerable deviations may occur with smaller quantities.

5.4.3 Depending on the information sought, 2 to 4 single samplings may be ground and mixed in order to limit the number of samplings for lengthier tests. The mixture obtained in this way is the crude sample of Bio-medical waste.

6 DRYING

A laboratory oven may be used for drying a small sample, and an industrial oven for a large sample. Weigh a pan, transfer the material to it and reweigh. Note the mass of the sample and dry in an oven at 70 to 75 °C for 24 h if the material is combustible, otherwise dry at 105 ± 1 °C. Remove the sample and allow to cool, preferably in a desiccator. Weigh, and again place in the oven for 1 to 2 h. Repeat the process of heating, cooling and weighing till the difference in mass between two successive weighings is less than one percent of the total previous loss in mass. Calculate the moisture content as percentage of the original mass. However, if microbiological tests are also to be conducted, drying shall be done at 40 to 50 °C.

7 GRINDING OR PULVERIZING

7.1 Waste material may contain glass, ferrous and non-ferrous metals, plastics, etc. Glass and ceramics may be separated by judicious sieving, plastics may be hand-picked as they are not degradable and interfere in the determination of carbon/nitrogen ratio, and ferrous metals may be removed by a strong magnet. After removal of these, proceed with grinding using a hammer-mill, grinding mill or pulverizer.

7.2 The remaining material may by ground with an appropriate pulverising equipment (crushing mill, hammer mill, ball mill, knife mill) until it becomes a farinaceous, homogeneous powder which is sifted through a 0.5 mm screen. The screening residue should be ground thoroughly to particles of the smallest size possible. The material in the form of sample is now ready for analysis.

7.3 Procedure for Combustibles

Place the sample collection box under the grinding machine. Plug the lead into the power outlet. Open the cut-off in the dust collecting system. Oil the grinder bearings with engine oil. Put on personal safety equipment. Start the motor and feed the sample into the mill. Turn off grinder motor and turn off the blower. Clean out the grinder and add this material to the ground sample.

NOTE — It is advisable to wear a transparent plastics face shield while feeding the material into the grinder. The analyst should not use his hand to help push material into the grinder past the feed slot. Do not open any grinding device while it is running. If the grinder clogs, turn off the motor before cleaning the apparatus.

7.4 Procedure for Compost

In a standard compost plant, the compost (final product) has to pass through 4 mm sieve. While preparing the sample in the laboratory, further grinding may be required for specific analytical procedures.

7.4.1 *Grinding of Compost*

a) Put a 2 mm sieve into the grinding mill. Care should be taken to not to lose any material after weighing the sample.
b) Replace the 2 mm sieve with a 1 mm sieve, if necessary, and regrind the sample retained on the sieve.
c) Brush out all inside surfaces of the mill into a separate container.
d) Put this material through a micro mill.
e) Add the product to the main sample.

7.5 Procedure for Non-Combustibles

Adjust the movable pulverizer plate to give a maximum size of about 2 mm. Put the sample through the pulverizer. Screen the ground material through 2 mm and 250 micron sieves. The material passing through 250 micron sieve is the required sample.

8 MIXING

The final mixing or homogenization is accomplished by transferring the sample to a suitable container that is not more than half filled by it. Close the container tightly, position it in a rotating mixer and allow to mix for not less than 2 h. Reduce the mixed sample in size if desired, by passing it through a sample splitter or by quartering. Weigh all metal, ceramic, plastics and glass removed during processing.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Solid Waste Management Sectional Committee, CHD 33

Organization	*Representative(s)*
Central Road Research Institute	Ms Anuradha Shukla (***Chairman***)
Alkali Manufacturers' Association of India	Shri K. Srinivasan Dr H. S. Das (*Alternate*)
Avantha Centre for Industrial Research, Yamunanagar	Dr Nishi Kant Bhardwaj Shri Sanjeev Gupta (*Alternate*)
Cement Manufacturers Association, New Delhi	Dr K. C. Narang Dr K.V. Reddy (*Alternate*)
Central Pollution Control Board, New Delhi	Shri J. S. Kamyotra
Central Road Research Institute, New Delhi	Shri Guruvittal Dr Neeraj Sharma (*Alternate*)
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Delhi Technological University, Delhi	Dr Rakesh Mehrotra Dr (Shrimati) Anubha Mandal (*Alternate*)
Department of Civil Engineering, Indian Institute of Technology, Delhi	Dr Mukesh Khare Dr Atul Mittal (*Alternate*)
Development Alternative	Dr K. Vijaya Lakshmi Dr Soumen Maity (*Alternate*)
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In personal capacity	Dr N. B. Majumdar
In personal capacity	Dr Vimal Kumar
Indian Centre for Plastics in the Environment, Mumbai	Shri T. K. Bandopadhyay Shri Gopal Jha (*Alternate*)
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Infrastructure Leasing and Financial Services	Shri Neeraj Chandra Shri Sandeep Malhotra (*Alternate*)
ITC Limited	Shri Sanjib Bezbaroa
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Ministry of Environment, Forest and Climate Change	Miss Sanchita Jindal Shri E. Thirunavukkarasu (*Alternate*)
Ministry of New and Renewable Energy, New Delhi	Shri Vinod Kumar Jain

Organization	*Representative(s)*
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Municipal Corporation of East Delhi, Delhi	SHRI RAVI DASS SHRI P. K. KHANDELWAL (*Alternate*)
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National Solid Waste Association of India	SHRI AMIYA KUMAR SAHU CAPT MANJU MINHAS (*Alternate*)
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Steps Pvt Ltd	SHRI T. RAGHAVENDRA RAO
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The Fertilizer Association of India, New Delhi	SHRI MANISH GOSWAMI SHRI B. KRISHNAPPA (*Alternate*)
Town and Country Planning Organization, M/o Urban Development and Poverty Alleviation, New Delhi	SHRI K. K. JOADDER DR SANTHOSH VIDYADHARAN (*Alternate*)
Ultratech Cement	AWAITED
BIS Directorate General	SHRI A. K. LAL SCIENTIST 'E' AND HEAD (CHD) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

Member Secretary

SHRISHTI DIXIT
SCIENTIST 'D' (CHD), BIS

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